

CLAIMS

What is claimed is:

- 5 1. A deposit monitoring apparatus located in a
hydrocarbon wellbore comprising:
 an acoustic device adapted to operate in a resonance
mode including a monitoring surface directly exposed to
10 fluids in a hydrocarbon wellbore, wherein the deposition of
material on the monitoring surface is monitored by
measuring a change in resonance frequency of the acoustic
device; and
 a power supply adapted to supply said monitor with
electrical energy.
- 15 2. The apparatus of claim 1, wherein the acoustic device
is mounted either permanently or quasi-permanently in the
wellbore.
- 20 3. The apparatus of claim 1, wherein the acoustic device
operates in a longitudinal mode.
4. The apparatus of claim 3, wherein the acoustic device
further comprises a transducer, and a focussing element coupled
25 to the transducer.
5. The apparatus of claim 4, wherein the focussing
element is an acoustic horn.
- 30 6. The apparatus of claim 1, wherein the resonance
frequency of the acoustic device is in the range of 10 kHz to
150 kHz.

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7. The apparatus of claim 6 wherein the resonance frequency of the acoustic device is in the range of 50 kHz to 100 kHz.

5 8. The apparatus of claim 1, wherein the monitoring surface is located on or near one of the following devices switches, valves, sleeves, mandrels, downhole separators and sensors located in the wellbore.

10 9. The apparatus of claim 1 further comprising a deposit removal system adapted to at least partially remove the deposition from the monitoring surface, the deposit removal system being in a control loop with said deposit monitor.

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15 10. The apparatus of claim 9, wherein the deposit removal system includes a deposition inhibiting or removing chemical agent.

20 11. The apparatus of claim 9, wherein the deposit removal system uses the acoustic device to exert a physical force onto the deposited material.

25 12. The apparatus of claim 9, wherein the deposition removal system is near a sensor having a surface exposed to the fluids and the deposition removal system is adapted to remove deposits from said exposed surface.

30 13. The apparatus of claim 12, wherein the sensor is selected from a group comprising optical sensors, electro-chemical sensors, or acoustic sensors.

14. The apparatus of claim 11, wherein the exposed sensor surface is selected from a group comprising optical windows, membranes, or sensitive areas of acoustic sensors.

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15. The sensor of claim 1, wherein the sensor includes an additional sensing system to analyze material deposited on the monitoring surface.

5 16. A deposit monitoring apparatus located in a hydrocarbon wellbore, comprising:

a deposit monitor adapted to measure deposition of material on a monitoring surface that is directly exposed to fluids in the hydrocarbon wellbore;

10 a power supply adapted to supply said monitor with electrical energy; and

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15 a deposit removal system in communication with the deposit monitor adapted to at least partially remove the deposition from the monitoring surface, the deposit removal system being in a control loop with said deposit monitor.

17. The apparatus of claim 16, wherein the monitoring surface is located on or near one of the following devices: switches, valves, sleeves, mandrels, downhole separators and
20 sensors located in the wellbore.

18. The apparatus of claim 16 wherein the deposit monitor further comprises an acoustic device adapted to operate in a resonance mode, wherein the deposit monitor measures deposition
25 of the material on the monitoring surface by measuring a change in resonance frequency of the acoustic device.

19. The apparatus of claim 18, wherein the acoustic device operates in a longitudinal mode.

30 20. The apparatus of claim 18, wherein the acoustic device further comprises a transducer, and a focussing element coupled to the transducer.